

C3 tack-welded to conductor 580. Centralizer 581 may substantially electrically insulate conductor 580 from conduit 582.

In the Claims:

Please cancel claims 2270-2308 and 5091-5100 without prejudice.

Please add the following claims.

sub 16/ 5150. (New) A method of treating a coal formation in situ, comprising:

providing heat from one or more heat sources to at least a portion of the formation;

allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that a permeability of at least a portion of the selected section increases, and is greater than about 100 millidarcy; and

controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H<sub>2</sub> within the mixture is greater than about 0.5 bars absolute.

5151. (New) The method of claim 5150, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

C4 5152. (New) The method of claim 5150, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

5153. (New) The method of claim 5150, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

5154. (New) The method of claim 5150, further comprising controlling the heat such that an

~~Sub D1~~ average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

~~Sub G1~~ 83  
5155. (New) The method of claim 5150, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

~~Sub D1~~ 83  
5156. (New) The method of claim 5150, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

~~Sub B1~~ 83  
5157. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

90 83  
5158. (New) The method of claim 5150, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

91 83  
5159. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

92 83  
5160. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

93 83  
5161. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

SubG17 94 83  
5162. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

95 83  
5163. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

96 83  
5164. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

97 83  
5165. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

C4 98 83  
5166. (New) The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

SubE16 100  
5167. (New) The method of claim 5150, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

SubG17 100 83  
5168. (New) The method of claim 5150, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

SubD187 5169. (New) The method of claim 5150, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

SubG17 102 5170. (New) The method of claim 5150, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

103 83 5171. (New) The method of claim 5150, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

SubD19 5172. (New) The method of claim 5150, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

SubG17 105 83 5173. (New) The method of claim 5150, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

SubD20 5174. (New) The method of claim 5150, further comprising producing a mixture in a production well, wherein at least about 7 heat sources are disposed in the formation for each production well.

C4 5175. (New) A method of treating a coal formation in situ, comprising:  
providing heat from one or more heat sources to at least a portion of the formation;  
allowing the heat to transfer from the one or more heat sources to a selected section of the formation such that a permeability of at least a portion of the selected section increases, and is greater than about 100 millidarcy; and  
producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

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SUB 217 5176. (New) The method of claim 5175, wherein the one or more heat sources comprise at least two heat sources, and wherein superposition of heat from at least the two heat sources pyrolyzes at least some hydrocarbons within the selected section of the formation.

5177. (New) The method of claim 5175, further comprising maintaining a temperature within the selected section within a pyrolysis temperature range.

5178. (New) The method of claim 5175, further comprising controlling a pressure and a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

5179. (New) The method of claim 5175, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

SUB 217 112 5180. (New) The method of claim 5175, wherein allowing the heat to transfer comprises transferring heat substantially by conduction. 107

SUB 217 C4 5181. (New) The method of claim 5175, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

SUB 217 114 5182. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins. 107

115 5183. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen. 107

SubG17 118 107  
5184. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

117 107  
5185. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

118 107  
5186. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

119 107  
5187. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

120 107  
5188. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

121 107  
5189. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

122 107  
5190. (New) The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

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Sub E21 5191. (New) The method of claim 5175, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

Sub C17 124 5192. (New) The method of claim 5175, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia. 107

Sub D22 5193. (New) The method of claim 5175, further comprising controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

Sub G17 125 5194. (New) The method of claim 5175, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H<sub>2</sub> within the mixture is greater than about 0.5 bar. 107

126 5195. (New) The method of claim 5175, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25. 107

Sub D3 5196. (New) The method of claim 5175, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

Sub G17 128 5197. (New) The method of claim 5175, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay. 107

Sub D4 5198. (New) The method of claim 5175, further comprising producing a mixture in a production well, wherein at least about 7 heat sources are disposed in the formation for each production well.